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his youth. It was, by my evidence, an old man's art, yet this observation that a young man wove or assisted may be true.

Cotton was alone used in weaving. Such possible substitutes as mountain sheep or dog hair were not used. Nor was sheep wool used since the advent of the whites: so far as I know, the Maricopa neither own sheep now nor had them formerly. The cotton cultivated in earlier days was white, not brown; growing on bushes waist-high or little more, and not like the man-high bushes of modern varieties of cotton grown in this district. It proved impossible to obtain any specimens of ancient cotton: it has entirely disappeared. Hrdlička observed (1905):

> According to information obtained from an old Maricopa, about forty years ago the people of his tribe planted native cotton, with which the men wove large decorated blankets.

They ginned the cotton by first beating it with a little stick. Then, spreading it on a flat stone, they rolled a smooth arrowweed across it to remove the seeds. This lap was layed aside; then others were similarly prepared and laid on the first. This was women's work alone. Day after day was spent in preparation until the necessary amount was accumulated.

The cleaned cotton was then spread on a smooth spot on the ground, over which clean sand had been sprinkled. A scraped arrowweed, about the size of an arrow, was strung to form a taut little bow. The bowstring was held close above the cotton and then plucked. The "tooth" of the string caught up the loose fibers; its vibration wrapped them into a compact roll around the string. This was then pulled off the string to serve as a sliver ready for spinning.[10] The first step was to roll the sliver into a loose yarn between palm and thigh.

[10] The cotton plucking bow must have had an interesting history in America: its ultimate source was Asia. My Maricopa informant ascribed its use to the Pima as well. He did not know whether the Papago had it. Doubtless they had, for, farther south Dr. Ralph Beals found it in 1931 in use among the Mayo (near the Rio Mayo and Navajoa, Sonora) for plucking wool fibers for spinning. The source for these tribes must have been the missions of northern Mexico. It occurs in South America, where Nordenskiöld records its distribution through the southern Amazon basin and southward. He writes: "We have here a cultural element that the Indians probably got from the Portuguese, presumably, as in the case of

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283 413 The spindle was a smoothed arrowweed shaft about two feet long and three-eighths of an inch in thickness. For the whorl, the inner part of the giant cactus was used, a dense wood. This was a straight stick about five inches long, one inch wide, and bored in the middle to slip on the shaft about six inches from its lower end. The lower end of the spindle was rounded; the upper end somewhat more pointed.[11]

283 The manipulation of the spindle consists simply in twirling it with the fingers of the right hand, the lower end resting on the ground, the pull of the left hand, holding the loose roving of cotton, giving the needed draft. From time to time the spinner stopped, unwound the partially spun yarn from above the whorl, tucked the spindle under his leg to hold it fast, and worked the yarn smooth between the nails of the right hand, before spinning again to give it further twist. An alternative method of spinning was to place the spindle with its lower end uppermost and resting on the right thigh; rolling it between the right palm and thigh, while the tip was supported in the cupped left hand. The Pima method of placing the lower end directly between the toes or in a wooden cup inserted between the toes was not in use.

Yarns intended for wefts were loosely spun, perhaps a quarter inch in diameter or more. Warp yarns had a tighter twist, hence a smaller diameter, to stand the excessive strain in the loom. Russell's description of Pima yarns applies here: [171]

> The warp is smoothly and evenly spun into a thread about 1 mm. in diameter. The woof threads are softer and about 3 mm. in diameter.

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[171] the pellet-bow, from India . . . . during the times of the Missions in the 17th and 18th centuries" (*Ethnography of South America*, p. 196). Of its occurrence in Asia, Laufer writes: "The method employed by the Chinese in preparing felt is the same as that used by the Tibetans, Mongols, and Turks, with a single exception: the first step they take is to loosen the wool by means of a large bow by tightening the string and jerking it off in rapid motion. This process is derived from that of treating cotton, and the bow in either case is identical" (*The Early History of Felt*, p. 7).

[11] The Pima spindle figured by Russell (*Pima Indians*, p. 149) is much the same, except that the cactus rib crosspiece is tied on. Bartlett observes that the Pima spindle is "a slender stick about two feet long passing through a block of wood" (*Personal Narrative*, II, 225).

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Cords for other purposes than weaving were always slender, perhaps one-eighth inch in diameter. The yarn was rolled into balls. 283

Dyed yarns were employed for bands and for the decorative selvage of blankets. For a bright red, the yarn was boiled with the root of a mountain plant, called itu'tà (now used by the Pima to dye willow twigs for baskets). It is similarly boiled with clays found in the mountains to obtain a dull red, dull black, or a faded orange. The red clay is that now used for painting pottery. No mordant was mentioned. 283 386

The Maricopa loom was horizontal, unlike that of the Pueblos and Navaho, but identical with Pima, Papago, and Opata. It consisted of four stakes driven into the ground, to which two warp bars were tied, parallel to each other and horizontal. The warp was laid directly over these bars. This was used not only for the larger fabrics, blankets, but also for the various belts and bands. 286 [171]

The belt loom was also known but perhaps not much used. Somewhat doubtfully I record Kutox's statement that it was used only after the advent of the Halchidhoma from the Colorado (*ca.* 1828). In this loom, the proximal end of the warps were tied to the belt of the weaver seated on the ground, the distal end to a convenient post at about the same height. This, of course, was used only for weaving narrow bands. No belt stick[22] was used.

The weaving of a cradle band on the regular horizontal type of loom was observed. Two pairs of stakes, set a foot apart, were driven into the ground at a distance equal to that desired for the length of the band. A stout arrowweed was tied horizontally on the outside of each pair, some nine inches above the ground, to serve as the warp bar. One end of the warp was tied to one warp bar at one side so that the knot lay at the bottom of the bar. The warp was carried under the opposite bar, and back over the top, thence to the first bar. It was passed over the bars always in this fashion: under the bar and back over the top. This resulted in the warps crossing each other to form a figure-eight (Pl. VIII).

[22] As at Zuñi (Spier, *Zuñi Weaving Technique*, p. 77).

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286 older women. The willow bark was stripped from the base of the tree upward, after a fire had been built near it to soften the bark so that long strips might be obtained. This bark was used for a wide variety of purposes and always prepared in the same fashion. It was soaked in water for three weeks, then the inner, finer layers could be stripped off.

My account of bark blanket weaving is very uncertain: the aged informant had never seen one made. Warps and weft were both rolled bark cords. It was said that the warps were doubled to hang over a horizontally suspended bar, the wefts being inserted first at the lower ends of the warps, and the whole closely woven. It was unknown how the lower ends of the warps were held: unless they were held, beginning at the bottom seems impossible. When the weaving reached the upper end, the bar was pulled out. It seems much more likely that the weft was twined, provided such fabrics were made at all. Last Star emphatically denied this, and it is quite possible that the foregoing is a misunderstood description of the making of a woman's bark skirt.

*Woven bags* (xal,ămĕ'c) were made to hold valuables, such as beads.[20] These were said to have been globular and closely woven with cotton yarn wefts and warps. Further details have been forgotten.

*Carrying devices.*[21]—The pack strap and the carrying net of 482 southern California were unknown,[22] women usually carrying loads unsupported on their heads, men on their shoulders. Where need arose articles might be transported by a woman in a blanket, the corners of which were tied together and resting on her forehead, or tied around her waist so that the package rested on the small of her back. A substitute for the blanket readily 285 made to carry home mesquite beans was a temporary mat of 482 arrowweed, called tcuĭtcĭ'tc. The weeds were placed thickly on the ground, their stems alternately in opposite directions, and willow twigs twined through at each end, and, if the mat was large, through the middle as well. The corners were drawn together and tied as with a blanket.

283 Heavy ropes were also made to tie up fire wood and the like.
482

[20] Cf. the Mohave (Kroeber, *Handbook*, p. 738).

[21] See also p. 330 for carrying habits.

[22] Also the netted carrying frames of Pima and Mohave and the net bags of the Pima.

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The strongest were of mescal fiber. Bundles of the dried leaves of this plant were brought home, pounded, the connective tissue shaken out, and the fibers rolled into rope.

Head rings (kwĭcko') were used by women to support pots and other articles carried on the head. In earlier days, these were made of the inner bark of the willow; now they are simply bound rolls of old cloth. The neighboring Pima and Papago similarly use rings of willow bark and less commonly plaited of agave (mescal) leaf,[23] but it is unlikely that the Maricopa made the latter.

*Metates and mortars.*—These were the principal utensils for the preparation of meals. A man must not even lay his hands on them: if he were discovered using them, he would be ridiculed as a berdache. Metates were used somewhat more than mortars even in the old days when mesquite, which required pounding in the mortar, was the primary food.

The metate was a flat slab, roughly rectangular, with one prepared face used for grinding with a hand stone or mano. The metate was of a granite-like stone; the mano of a hard, close-grained sandstone. They were considered very valuable since it required a long time to work these tough stones into shape and they were constantly needed for household tasks. Both were formed by pecking with any convenient pointed boulder. Like the Pima, stone axes found in nearby ruins were also used to dress them. One small metate seen was roughly twenty-one inches long by fourteen inches wide and two inches thick. It was perfectly flat transversely, but, on its working surface, slightly concave longitudinally. The mano in use with this was as long as the metate was wide, and had a width such as to be conveniently grasped (fifteen inches long; five and a half inches wide; two inches thick). It was of rectangular cross-section, slightly convex in a longitudinal direction on top, with a true flat surface on the bottom (i.e., the grinding surface) which rose at an angle near each end.

When the metate was to be used, the woman knelt behind it.

[23] Russell, *Pima Indians*, p. 113; Kissell, *Basketry of the Papago and Pima*, p. 159.

The *mush stirrer* (cu.ŭ'n) was simply three or four arrowweeds, dressed and held by loose twining at the handle end. Their lower ends were then trimmed off even (Pl. XIV, *d*).[29] 415

A *broom* (n,imama'l) was simply a large bundle of arrowweeds bound at one end. [412]

*Temporary cups and bowls* were sometimes fashioned by hollowing out small barrel cacti when travelling.

The *rabbit net* (ca'a'k) was a purse net set in the runway. It was about a yard square. A stout cord threaded through all four edges was attached to a stake. The rabbit dashing into the net, spread open on the bushes, pursed it and was held fast by the stake. The cordage for the net was rolled of the strings of black-eyed pea pods. The net was made on a loop foundation (at upper left corner, Pl. XI). Twenty-five or thirty meshes formed the first row: these tied together (?) were called an ear (smalk). No net gauge was used. 224 286 [283]

*Flageolet.*—This instrument was used in lovemaking, but not as an accompaniment to song. "A boy was certain to get a girl if he used it." It was a large reed, up to two feet in length, so chosen that it was formed of two internodal sections with a single node or septum between, both ends then being open. Small holes were made on each side of the node so that it could be pierced, perhaps slotted between these holes. In addition, four finger holes were made near the distal end of the flageolet. To play it, one blew into the open proximal end which was held between the lips; the forefinger of the left hand partially covered the holes at the node to serve as a reed, while the fingers of the other hand lay on the holes near the distal end. The instrument was called w'ilw'i'l or less properly taltal. 534 [832]

## WEAPONS

Armament for the Maricopa consisted of bows, short wooden clubs, and small circular shields. A special pike was carried by the battle leader alone; rarely other men armed themselves with simple wooden pikes. Armor, pole-length clubs, and stone headed clubs, all used in this area, were unknown. The Maricopa 411

[29] No. 2-11874.

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curving abruptly near the ends, and being always kept strung, they retained the curvature they were given. A hunting bow which I obtained (Pl. XII, *c*)[32] was fifty inches long; had a depth from string to belly of six inches, and measured one and a half by half an inch at the grip. A similarly shaped boy's bow seen, made of mesquite, was four feet three inches long, six inches deep, with a grip one inch by three-quarters. These were normal lengths for shorter bows. They were cut tapering uniformly toward each end: the width and thickness at the middle were measured only by the feel of the grip in the hand. They were given the desired curvature by burying the still green bow in hot ashes and bending it over the knee. The tips were squared across and provided with a notch on each side. Bows were painted black and red except for the grip which was ordinarily left unpainted. The strings were made of soaked sinew rolled on the thigh. Bows were not kept in cases when out of use, but hung horizontally inside the house on two pegs driven into the wall.

Sinew-backed bows had sinew laid on the back, where it was held in place by sinew bindings every few inches, but not glued. This was probably a bundle of sinew cords or a single large cord, not a layer lying flat; yet such bows were called "sinew-plastered" (gucĭma'mhotcŭ'k). The sinew was brought to the very tips but not over them. These bows differed from self bows only in their flatter cross-section.

When shooting, the bow was held nearly vertically, the hand gripping it exactly at the middle. The arrow passed on its left side, steadied by the left forefinger. I was told that only the primary release was used, that is, the nock was gripped between thumb and forefinger. This may well have been the intention but in demonstration by two old men, their second and third finger tips pulled on the string (Pl. XI). It is my notion, borne out by this case, that the so-called primary, secondary, and tertiary releases are everywhere simply variations of one theme, namely, the secondary.[33]

Arrows were perhaps invariably made of arrowweed (*Pluchea*).

[32] Washington State Museum, No. 2-11919.

[33] Cf. Kroeber, *Arrow Release*.